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THE 1941 FOREST INSECT SURVEY OF YOSEMITE NATIONAL PARK

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THE 1941 FOREST INSECT SURVEY OF YOSEMITE NATIONAL PARK

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THE 1941 FOREST INSECT SURVEY OF YOSEMITE NATIONAL PARK

INTRODUCTION

The 1941 forest insect survey of the Yosemite National Park was made during the period September 13 to 20, 1941 by staff members of the Forest Insect Laboratory, Berkeley, California. The field work was carried out by a four-man crew consisting of G. R. Struble, C. B. Eaton, H. L. McKenzie, and J. E. Patterson. Patterson is responsible for interpretation of the field data and the general estimates. The cost of the survey was borne entirely by the Forest Insect Laboratory.

The purpose of the survey was to obtain, by accepted general reconnaissance methods, an understanding of the characteristics of current infestations in the Park forests and the amount of damage resulting from these infestations.

This survey supplements, but does not replace, the examinations which are made seasonally by the National Park Officers. Free use has been made of the information reported by Park Officers and this cooperation is acknowledged.

EXTENT AND METHOD OF SURVEY

The survey this year was directed toward covering all the ponderosa pine-sugar pine forests by general reconnaissance methods; utilizing sample plots and road strip surveys to obtain basic data on infestations and losses. Certain areas of high recreational use such as Yosemite Valley and the Mariposa Grove were given special attention owing to the greater insect hazard. The Jeffrey pine, lodgepole pine, and fir forests of the High Sierra were covered by general reconnaissance methods only.

The infestation units set up in the 1939 survey were again used without revision. These units were erected to survey local areas of definite boundaries and subject to localized insect attacks. The total gross area of the infestation units now recognized amounts to 334,720 acres. Maps of the park showing the location of these units are included in the appendix of this report.

There are two permanent sample plots in the ponderosa pine-sugar pine forests which supply basic data on current insect trends. In addition to an intensive cruise of these plots, road strip surveys along the roadways traversing many of the units were surveyed this year. These intensive surveys were supplemented by general reconnaissance and topographic viewing. The resultant data, shown in Tables I and II are the basis for the estimates of the total 1941 infestations shown in Table III.

In the 1941 survey the Park was divided into three principal infestation areas or zones corresponding to timber types. These zones are designated as: 1, the transition type forest of ponderosa pine-sugar pine, and including Douglas fir and white fir; 2, the Jeffrey pine type, including white fir and red fir; and 3, the subalpine type of lodgepole pine, firs, and hemlock. Since insect trends in each of these forest types are generally different they are reported separately.

GENERAL INFESTATION CONDITIONS

A pronounced general decline in insect caused losses in pine occurred during the year in all the transition type forests. The greatest decline in these forests occurred in the lower elevations and in the marginal stands of ponderosa pine. Infestations in sugar pine also registered a sharp decline from former status. Insect losses in ponderosa pine on the better site areas remained about static. On no areas in these forests was the year's infestation in pine of sufficient intensity to cause immediate concern or to warrant control measures. On the other hand fir losses have greatly increased. These increased fir infestations are general throughout the stands but are greatest in white fir in the Tuolumne drainage and in Douglas fir on the Carl Inn Acquisition.

Conditions during the year in the Jeffrey pine zone have followed a different trend with increased losses in certain areas of these stands. Infestations in Jeffrey pine generally have remained about static, but the insect toll in both white and red fir has materially increased, reaching near epidemic proportions on the upper Tuolumne drainage. Losses in lodgepole pine in this region also increased during the year. The trend in this zone is toward increased losses in all tree species.

The units in the subalpine zone were surveyed by general reconnaissance methods only, although the estimates given are believed to be reliable in presenting an accurate picture of current conditions. Throughout this zone there exists a persistent subnormal infestation of the mountain pine beetle in lodgepole pine. However, in no single unit has this infestation developed to alarming proportions although potential damage is always present. On the other hand fir losses have materially increased during the year. The lodgepole pine needleminer has shown a pronounced tendency to spread from the established nuclei at Forsyth Pass and in the Benson Lake region north of the Tuolumne. Reports from Park Officers1/ indicate that this insect is again becoming well established in the lodgepole pine forests of the High Sierra. The current survey indicates that the infestation trend of all the damaging insects of this zone is toward increased losses.

1/ Letter from Superintendent Kittredge, November 27, 1941, containing excerpts from 1941 needleminer reconnaissance.

INSECT SPECIES AND HOST TREE INVOLVED

During the year the western pine beetle, Dendroctonus brevicomis, and the mountain pine beetle, Dendroctonus monticolae, continued to be the principal insects responsible for the greater losses in ponderosa pine and sugar pine respectively. The mountain pine beetle alone was responsible for losses in lodgepole pine. The Jeffrey pine beetle, Dendroctonus jeffreyi, was outstanding in Jeffrey pine depredations although the flatheads, Melanophila spp., were common in attacks on this species. However, the increased activity of the former is responsible for the increased infestations in the Jeffrey pine stands. White fir and red fir losses were due in the larger measure to the fir engraver beetles, Scolytus ventralis and Scolytus subscaber. Trees attacked by these species were usually infested by the roundhead, Tetropium abietis, which filled in the basal trunk although attack was nearly always initiated by the engravers. Losses in Douglas fir are attributable to the fir flathead, Melanophila drummondi. This insect has shown greatly increased activity during the year. The pine engraver beetles, Ips spp., were relatively inactive during the year. Their attacks, when present, were secondary to that of the Dendroctonus beetles and were confined to tops and limbs of trees.

CONDITIONS ON UNIT AREAS

The principal park forests were subdivided into definite infestation units in the 1939 survey. These units have been retained for measuring the 1941 losses on these local areas. The estimated losses on them for the two year period 1940-1941 are shown in Table III. A comparison of these annual losses indicates the current infestation trend.

Decidedly low endemic infestations prevailed in the pine forests on the following units:

Kibbie	Miguel Meadows	Hetch-Hetchy
Bald Mountain	Crane Flat	El Capitan
Big Meadows	Merced Canyon	Tunnel-Chinquapin
Wawona Road	Chilnualna Creek	Sunrise
Yosemite Creek	Porcupine Flat	Tenaya Creek
Echo Creek	Merced Lake	

While infestations in pine on these units have generally decreased to an extent averaging 28 percent, fir losses have increased approximately 25 percent. However, these fir losses have not yet reached alarming proportions, but they should be carefully watched.

Middle Fork Unit: A slight decrease in Jeffrey pine losses occurred during the year so that present conditions in this species are satisfactory. Lodgepole pine losses due to depredations of the mountain pine beetle increased 57 percent over former status. This increase was due to a localized infestation in the region west of White Wolf and is not generally distributed over the unit. Fir losses were slightly increased during the year.

Crane Flat Unit: Pine losses here registered a decided drop since 1940, the current infestation being the lowest recorded for the past 5 years. White fir losses materially increased. Douglas fir in the Carl Inn section suffered severely from depredations of the flathead, Melanophila drummondi. These losses increased 66 percent during the year, on a localized area on Crane Creek. Should this infestation continue to increase it will be necessary to reduce it by control measures next year.

Illilouette Unit: Insect caused losses in pine were greatly reduced during the year, but fir losses slightly increased. On the whole conditions remain satisfactory. Owing to the high esthetic value of the forests in this High Sierra area any losses above the minimum should be prevented by prompt control work. A close watch on developments in this unit is recommended.

Bridal Veil Unit: The forests in this unit are largely composed of fir and lodgepole pine, both of which have greatly suffered from insect depredations during the past few years. Infestations in both species have increased during the year. The lodgepole pine loss amounted to a total of 125 trees largely grouped in several small campground areas near the Glacier Point Road. If this infestation should increase above the 1941 status, it will be necessary to reduce it by control action, or else lose many trees on the most desirable camp sites. The fir loss is greatly distributed over the unit, but has not yet reached alarming proportions.

Mariposa Grove: Because of intensive recreational use of the Grove area, constant protection against insect caused losses is highly desirable. Maintenance control has been practiced for the past 8 years in an all out effort to keep losses down to a minimum. These measures, in the main, have been successful although timing of the work has not always coincided with the periods when broods were in the trees.

A 24 percent cruise of the Grove area was made in the 1941 survey. The results of this examination indicate a considerable decrease in pine losses, with losses in fir remaining static. The 1941 infestation on the entire area is estimated to be 6 ponderosa pine trees, 8 sugar pine trees, and 30 white fir trees. In comparison with previous years this kill can be recognized as definitely endemic. However, even minimum losses should be prevented since they constitute a potential hazard. Intensive maintenance control, timed to coincide with insect activity, is recommended.

Yosemite Valley Unit: The floor of the valley is the most intensively used area in the Park. Constant vigilance and periodic control has kept insect losses down to a bare minimum during the past several years. This desirable condition was maintained during the past year, with consequent loss of less than 20 trees on the entire unit. Maintenance control is highly recommended for this unit.

SUMMARY AND RECOMMENDATIONS

A forest insect survey of the Yosemite National Park was made in September 1941 by the Bureau of Entomology and Plant Quarantine. This survey was of the extensive reconnaissance type supplemented by plot cruises and road stripping in special areas.

In general losses attributable to insects during the past 3 years have greatly declined in pine, but have slightly increased in fir. During the past year the decline in pine losses amounted to 28 percent; on the other hand, fir losses increased approximately 25 percent generally. On some units the increased fir infestation amounted to 150 percent.

Infestations in Jeffrey pine have been sporadic, varying greatly in different areas, but generally lower than in previous years. Infestations in ponderosa were definitely lower during the year. Sugar pine losses were only slightly lower than previous status. Lodgepole pine losses due to depredations of the mountain pine beetle increased 57 percent on a local area near White Wolf. On other areas these losses remained static, or were slightly increased.

Melanophila drummondi infestations in Douglas fir have greatly increased in the Carl Inn acquisition. Losses on this area increased 66 percent during the year.

Increased activity of the lodgepole pine needleminer, and the recent spread from old infestation nuclei, was one of the alarming features of the 1941 infestations.

Maintenance control is recommended in Yosemite Valley, on the Wawona Road strip and in the Mariposa Grove. Areas which should be closely watched for increased infestations and probable early control are the Carl Inn acquisition, White Wolf, Illilouette Basin, and Bridal Veil Meadows.

It is highly desirable that the Park Service continue the detection surveys practiced during recent years.

TABLE I. COMPARATIVE MEASURED PLOT LOSSES, 1939, 1940, 1941*

Sample Plot	Species	1939 Number Trees	1939 Volume b.m.	1939 Trees per A.	1940 Number Trees	1940 Volume b.m.	1940 Trees per A.	1941* Number Trees	1941* Volume b.m.	1941* Trees per A.
Aspen Valley 320 acres	PP	12	24,160	.04	7	2,850	.02	0	0	0
	SP	1	6,120	.001	2	4,520	.006	0	0	0
	Total	13	30,280	.041	9	7,370	.026	0	0	0
	WF				1	1,500	.001			
	Plot total	13	30,280	.041	10	8,870	.027	0	0	0
Mariposa Grove 480 acres	PP	7	28,240	.015	4	12,510	.01	0	0	0
	SP	8	40,560	.017	4	15,340	.01	2	2,250	.004
	Total	15	68,800	.03	8	27,850	.02	2	2,250	.004
	WF				9	20,780	.02	9	15,840	.02
	Plot total	15	68,800	.03	17	48,630	.04	11	18,090	.024

* 1941 overwintering losses are not known or reported. Complete losses for that year will not be available before June 1942.

TABLE II. UNIT ROAD STRIP LOSSES, 1940-1941

Unit	Road Strip	Species	1940 Number Trees	1940 Volume b.m.	1940 Estimated Trees per Section	1941 Number Trees	1941 Volume b.m.	1941 Estimated Trees per Section
Hetch-Hetchy	600A	JP	2	800	3	3	1,320	4
		DF				1	600	2
Crane Flat	500A	PP	2	1,800	3			
		SP				2	6,000	3
		WF				6	7,200	8
		DF				11	12,100	15
Big Meadows	500A	PP	4	3,200	10	4	3,000	6
		SP						
Chinquapin	500A	PP	2	2,750	6	1	1,200	3
		SP				1	2,800	2
Wawona Road	980A	PP	2	1,200	4	1	750	4
		SP				1	2,000	2
Wawona Basin	720A	PP						
		SP						

TABLE III. ESTIMATED UNIT LOSSES, 1940-1941

Unit	Area in Acres	Species	1940 Number Trees	1940 Volume b.m.	1941 Number Trees	1941 Volume b.m.
Bald Mountain	9,600	PP-SP	135	108,000	75	60,000
		Fir	60	40,000	80	60,000
Crane Flat	23,040	PP-SP	250	225,000	70	50,000
		WF	80	50,000	200	140,000
		DF	90	90,000	150	150,000
Big Meadows	5,120	PP-SP	100	80,000	70	55,000
Merced Canyon	5,120	PP	30	18,000	20	12,000
Yosemite Valley	9,600	PP-SP	20	16,000	15	12,000
Tunnel-Chinquapin	9,600	PP-SP	60	72,000	30	35,000
		WP	45	30,000	60	40,000
Wawona Road	16,000	PP-SP	80	80,000	50	50,000
		WF	75	50,000	100	70,000
Wawona Basin	12,800	PP-SP	60	48,000	20	16,000
Mariposa Grove	2,560	PP-SP	8	28,000	2	2,200
		WF	9	21,000	9	16,000
Chilnaulna Creek	14,080	PP-SP	45	45,000	35	21,000
		WF	60	24,000	70	28,000
Kibbie	9,600	JP	No data		70	28,000
Miguel Meadows	15,360	JP	No data		72	32,000
Hetch-Hetchy	7,040	JP	35	15,000	35	18,000
		DF			15	9,000
Middle Fork	40,320	JP	360	180,000	240	144,000
		LP	400	60,000	630	90,000
		Fir	450	315,000	600	420,000
El Capitan	9,600	JP	120	60,000	90	45,000
		Fir	150	90,000	180	125,000
Sunrise	12,800	JP	100	35,000	70	25,000
Illilouette	38,400	JP	150	60,000	100	40,000
		Fir	60	30,000	70	35,000
Yosemite Creek	16,000	LP	250	50,000	200	40,000
		Fir	260	180,000	300	210,000
Porcupine Flat	12,800	LP	200	30,000	250	10,000
		Fir	120	48,000	160	65,000
Tenaya Creek	4,480	LP	15	1,500	20	2,000
Echo Creek	12,800	LP	100	20,000	80	16,000
Merced Lake	32,000	LP	250	30,000	200	25,000
Bridal Veil	16,000	LP	100	20,000	125	25,000
		Fir	250	75,000	300	90,000
Totals	334,720		4,542	2,324,500	4,863	2,311,200

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BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
FOREST INSECT LABORATORY - BERKELEY, CALIFORNIA

FOREST INSECT SURVEY

STANISLAUS-YOSEMITE INFESTATION AREA

MT. DIABLO MERIDIAN, CALIFORNIA

LEGEND

N

SCALE
0 ½ 1 2 3 4
INCHES MILES

SAMPLE PLOT
UNIT BOUNDARY

120° 00'
10'
50'
40'
38° 00'
50'
40'

T. 3 N.
T. 2 N.
T. 1 N.
T. 1 S.
T. 2 S.
T. 3 S.

R. 16 E.
R. 17 E.
R. 18 E.
R. 19 E.
R. 20 E.
R. 21 E.
R. 22 E.

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
FOREST INSECT LABORATORY - BERKELEY, CALIFORNIA

FOREST INSECT SURVEY

SIERRA-YOSEMITE INFESTATION AREA

MARIPOSA AND MADERA COUNTIES, CALIFORNIA

MOUNT DIABLO MERIDIAN

N

SCALE
0 1 2 3 4 5 6
MILES

LEGEND

— — Unit Boundary

◎ Sample Plot